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Providing Sewerage System In Civic Amenities And Infrastructure Deficient Area And Other Approved Area Including Construction Of STP/ SPS Along With O&M For One Year

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Abstract - *The Ministry of Urban Development, GOI, have launched AMRUT (Atal Mission for Rejuvenation and Urban Transformation) programme in June 2015 to achieve the targets of infrastructure. As per the guidelines under AMRUT mission the items related to sewerage sectors have been taken under the program are Rehabilitation and expansion of sewerage network total Length-129.485Kms in 12no's approved colonies and 12no's Villages which are in M.C. limit. Including property connections and Waste water treatment system in suitable area. This report is about the Construction of the sewerage network and Construction of 3 Intermediate / Main sewage pumping station(MPS), 3 Sewage Treatment Plant(STP) including civil , Mechanical & Electro Mechanical, Instrumentation & automation.*

***Key Words*: AMRUT, sewerage, waste water, SBR, sludge, sewage network, man holes**

1. INTRODUCTION

The Ministry of Urban Development, GOI, have launched AMRUT (Atal Mission for Rejuvenation and Urban Transformation) program in June 2015 to achieve the targets of infrastructure. Creation of basic services like water supply, sewerage, urban transport and providing amenities in cities to improve the quality of life for all, especially the poor and disadvantaged which is a national priority, is the main aim of this mission.

Under this mission, 18 towns are identified in state of Haryana out of which Palwal town of state of Haryana has been selected as one of the beneficiaries under AMRUT program. Under this program, basic infrastructural services such as water supply, sewerage, drainage, urban transport etc. amongst others are to be provided to improve the quality of life for all, especially the poor and the disadvantaged. Total Sewerage Network Length-129.485Kms in 12no's approved colonies and 12no's Villages which are in M.C. limit.

Construction of 3 STP & 3 Main Pumping Stations (MPS) including civil, Mechanical & Electro Mechanical, Instrumentation & automation etc.

- 15MLD STP & MPS at Jodhpur village
- 10MLD STP at Agwanpur Village & MPS at Basantgarh Village
- 2.5MLD STP & MPS at Firozpur Village

Services under this contract shall cover:

- Design & Build [Design, Construction and commissioning of the project components, including continual designs submissions and approval as per the project methodology approved during SIP(services improvement plan) preparation]
- Operating & Maintenance of created assets for 5 years after defect liability period of 1 year.

As per the guidelines under AMRUT mission following items related to sewerage sectors have been taken under the program

(i) Rehabilitation and expansion of sewerage network including property connections.
(ii) Waste water treatment system in suitable area.

1.1 Scope of study

Major scope of works in this scheme shall include:
a) Construction of the sewerage network, including property connections and road restoration, etc.
b) Construction of Intermediate / Main sewage pumping station, Sewage Treatment Plant, etc.
c) Provision for infrastructure for re-use of treated effluent for parks and green spaces, etc.

1.2 Objective

The Program objective is to improve the economic development by providing the infrastructure and service in the sewerage sector.

1. The improvement of quality of life and thereby effective contribution of beneficiary people in the economic activity is expected.
2. The project therefore focuses on service delivery along with the creation of quality assets and service delivery monitoring systems.
3. Objective of the project is to collect all sewage generated within the project area of Palwal town through sewerage network and providing treatment facilities.

2. METHODOLOGY

1. Detail Design Engineering based on Survey works and consisting of but not limited to Hydraulic modeling using suitable software for Waste Water Components such as Sewer network, planning and design of civil, structures, electro-mechanical equipments, instrumentation SCADA etc.
   For Project area, also to keep in view future development of adjacent area in ULB limit.
2. Construction of Sewer Network of various sizes from 200 mm to 700 mm.
   129.485 Km Sewerage Network in 12 recently approved colonies, 12 no villages included in M.C. limits, which do not have sewerage facilities, has been proposed with sewerage facilities. The size-wise abstract of proposed sewer lines taken in the project are replaced as below:

Size (mm)	Length (m)
200	82142
250	12003
300	10599
400	8829
500	5649
600	1782
700	8481
Total	**129485**

3. Construction of pre- cast RCC M-40 grade circular manholes.
   Total 2508 manholes as per details below:

1000 mm dia	676nos
1200 mm dia	1174nos
1500 mm dia	658nos

4. construction of Cast in situ RCC M-30grade circular manholes
   Total **315** nos. as per details below:

1800 mm dia	233nos
2100 mm dia	82nos

5. Construction of Brick Masonry Manholes.
   1200 x 900mm - 1972nos.
6. Construction of precast inspection chambers for property connections with connecting pipe length of 100mm and 150mm dia DWC Pipe.
   Size 450 mm X 450 mm - 3732 Nos.
   Size 450 mm X 600 mm -658 Nos.
   with 12.183 km of 100 mm dia. and 0.987 km 150 mm dia DWC connecting pipe.
7. Construction of intermediate pumping station at two locations, including civil, electrical, mechanical, instrumentation & automation etc. This also includes laying of DI/K-7 pumping mains from IPS to manhole/STP.
   - 1 No. IPS at Meghpur Village having ultimate peak flow velocity of 23.75 cum per hour.
   - 1 No. IPS at Kithwari village having ultimate peak flow velocity of 76.25 cum per hour.
8. Construction of Main Pumping Stations with Sewage Treatment Plants at 3 locations including civil, electrical, mechanical, instrumentation & automation etc. This also includes laying of DI/K-7 pumping mains from MPS to STP.
   - 1 No. MPS for Zone No.1, on Jodhpur village road having ultimate peak flow capacity of 1406.25 cum per hour.
   - 1 No. MPS for Zone No.2 near Prakash colony having ultimate peak flow capacity 937.5 cum per hour.
   - 1 No. MPS in Ferozpur village having ultimate peak flow capacity of 260.42 cum per hour.
   - STP for Zone No. 1 on Jodhpur village road having capacity of 15 MLD average flow.
   - STP for Zone No. 2 Prakash colony having capacity of 10 MLD average flow.
   - STP for Zone No. 3 at village Ferozpur having capacity of 2.5 MLD average flow.
9. As per site requirements, Construction of Pumping station including civil, electrical, mechanical, instrumentation & automation etc. for disposal of treated waste water from STP to the receiving drain.
10. Providing & Laying of DI/K-7 pumping/gravity main from STP to Disposal point.

500 mm dia	length 1200 meter from Zone no. 1 STP to disposal point
450 mm dia	Length 7200 meter

	from Zone no. 2 STP disposal point
200 mm dia	length 300 meter from Zone no. 3 STP disposal point

11. Sewer crossing by Trenchless method at 7 locations:

600 mm internal diameter	For crossing Bhangori Minor between Village Ronija and Lohagarh at **two** locations - 40 m
700 mm internal diameter	For Village Kuslipur, Mini Secretariat and adjacent area to be crossed Palwal - Mathura (GT road) near Chauhan Service Station – 30m
700 mm internal diameter	For crossing the Minor for Village Dholagarh near Omaxe city – 15 m
700 mm internal diameter	For crossing Bhangori Minor at Off take Agra Canal in Palwal - Kithwari area – 25m
500 mm dia HDPE pipe	For crossing the NH-2 for carrying the discharge of Village Allahpur to Village Firozpur -30m
500 mm dia HDPE pipe	For crossing Palwal distributory at T junction of Agra Canal- 15m

12. Dismantling & restoration of existing surfaces i.e. brick work/bituminous road/CC road/Interlocking pavers.
13. Operation and Maintenance of sewerage system including
    i. Sewerage network - property connection, road restoration and other ancillary works created under the contract.
    ii. Main Sewage Pumping Station along with Sewage Treatment Plant for Zone No. 1, 2, and 3.
    iii. IPS at Villages Meghpur and Kithwari with pumping main.

2.1 Topographical Analysis

Topography may be described because the examine of the exceptional functions and kinds of the land surfaces. Topography is a subject of geosciences and planetary technology and is involved with nearby element in general, inclusive of now no longer most effective relief, however additionally herbal and synthetic functions, or even nearby records and culture. The time period topography is specifically originated within side the historic Greece that's having that means because the targeted description of the place. The important goal of the topography is to get to understand approximately the coordinate device of the task place. From coordinates we imply the precise longitude and longitude of the place and additionally understanding approximately the positions of the functions positioned in our task place. A topographic examine can be made for a whole lot of reasons: navy making plans and geological exploration had been number one motivators to begin survey programs, however targeted facts approximately terrain and floor functions is important for the making plans and creation of any important civil engineering, public works, or reclamation projects. Another important factor of the topographical evaluation is the understanding of G.L. (Ground Elevations). It is the maximum important and crucial factor that's to be cautiously taken as they'll determine the slope of the place, places of the water additives such Over Head Tank, Pump and remedy gadgets etc.

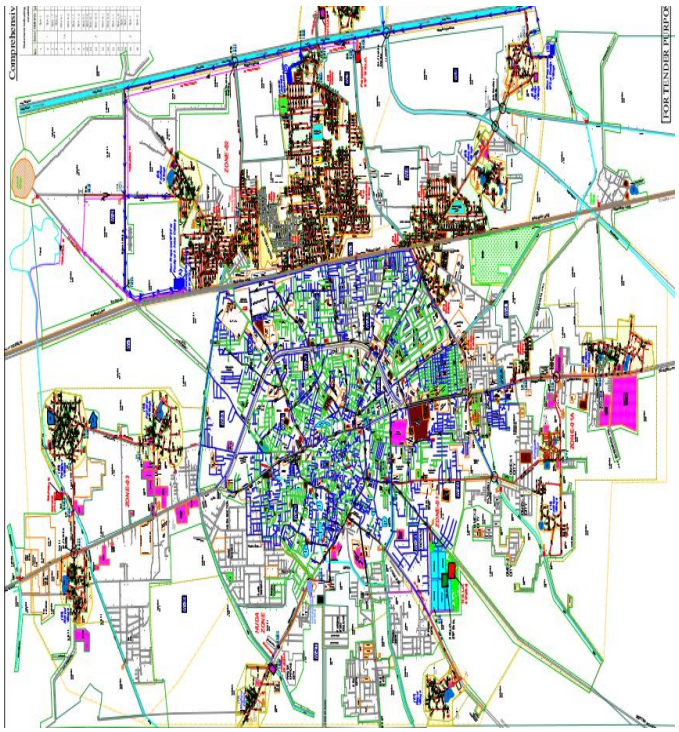

Fig: proposed pipeline with STP for palwal city

3. RESULTS AND DISCUSSION

3.1 Selection of pipe material

Pipes shall be free from all defect including indentations, delaminating, bubbles, pinholes, cracks, pits, blisters, foreign inclusions that due to their nature degree or extent detrimentally affect the strength and serviceability of the pipe. The pipe shall be as uniform as commercially practicable in color opacity, density and other physical properties as per relevant IS Code or equivalent International Code. The inside surface of each pipe shall be free of scouring, cavities, bulges, dents, ridges and other defects that result in a variation of inside diameter from that obtained on adjacent unaffected portions of the surface. The pipe ends shall be cut clearly and square to the axis of the pipe.

1. **Double Wall Corrugated (DWC) HDPE Pipes**
   The manufacturing, testing, supplying and testing at work sites of HDPE-DWC pipes shall comply with IS 16098 Part-II: 2013 and all currently applicable statutes, regulations, standards and Codes.
2. **DUCTILE IRON (DI) PIPES**
   DI pipes and fittings (Class K-7) shall be in accordance with IS: 8329 and IS: 5382.
3. **RCC PIPES (HDPE Lined)**
   The method of manufacture of RCC pipes (class NP3 and NP4) shall be such that the form and the dimensions of the finished pipes are accurate within the limits specified in relevant clause of IS: 458: 1988.

3.2 Storage

Each stack of pipes shall contain only pipes of same class and size, with consignment or batch number marked on it with particulars of suppliers wherever possible. Storage shall be done on firm level and clean ground and wedges shall be provided at the bottom layer to keep the stack stable. The stack shall be in pyramid shape or the pipes laid lengthways and crosswise in alternate layers. The pyramid stack shall be made for smaller diameter pipes for conserving space in storing them. The height of the stock shall not exceed 1.5 m.

3.3 Specifications for Precast / Cast Insitu RCC Manholes

S. No.	Range of Depths (m)	Diameter
	Precast Manholes	
1	Above 1.5 m and up to 1.79m invert depth	1000
2	Above 1.8m and up to 2.99m invert depth	1200
3	Above 3.00m and up to 4.79 m invert depth	1500
	Cast in Situ	
4	Above 4.80 m and up to 5.99 m invert depth	1800
5	Above 6.00 m and up to 7.19 m invert depth	2100
6	Above 7.20 m and up to 8.99 m invert depth	2400

3.4 Design Constrains

In designing of pipes, the following standard shall be referred. In all cases the latest revision of the Codes shall be referred. If requirements of this Specification conflict with the requirements of the standards / Codes, this Specification shall govern:

i. IS 4905:1968 Methods for random sampling.
ii. (Part 1): 1986 Method of measurement of outside diameter.
iii. (Part 8):1986 internal hydrostatic pressure test.
iv. IS 5382:1985 Specification for rubber sealing rings for gas mains, water mains and sewers (first revision). Type-I & Type-VI.
v. The materials used in the manufacture of DI pipes and fittings shall comply with requirements specified in IS: 8329 and IS: 5382.
vi. IS: 456:2000 Code of practice for plain and reinforced.
vii. IS: 783:1985 Code of practice for laying of concrete pipes.

4. CONCLUSIONS

As per provisional reports of census India, population of palwal is 128,730. The existing drainage system failed to drain out complete municipal waste water. The city does not have proper drainage system, so underground sewage system is required for evading the problem of poor sewage. Planning of a proper sewage system will solve the problem of deadly diseases, land and water pollution, obstruction of drains and loss of biodiversity etc.

Palwal City has been divided extensively into zones for the sewerage services. Zoning has been executed according to the topography of the town to facilitate smooth series and disposal of town sewage. In Zone-1, the area contained between Palwal distributor on North, Bhangori Minor on South and Delhi-Agra railway line on East which

discharges into 9MLD STP based on oxidation pond technology and situated at Jodhpur road.

Area lying between the railway line and Agra canal and the ward no. 2 (Part), 3, 4, 5, 6 & 7 constitute the zone-2. Recently approved colonies such as Amar colony, Govind Nagar, Kailash Nagar, Mohan Nagar, Rajiv Nagar, Prakash Colony, New Shamshabad colony, Bihari Colony and Hari Nagar (North) are lying in this zone-2.

New proposed sewage pipeline for palwal city based on the STP with SBR technology. In sequential batch reactor(SBR), all treatment steps are done in single tank. a unique feature of the SBR system is that there is no need for a return activated sludge (RAS) system. there is no need of primary settling tank and sludge digester. It require less space as compared to oxidation pond technology that makes it more economical. SBR principle based on five processes that are filling, aeration, reaction, settling and decanting.

Need for recycling of treated wastewater in lots of parts of the world has necessitated the introduction of more recent stringent requirements for treated wastewater. Unlike the traditional wastewater treatment plants, SBR-primarily based totally wastewater treatment plants can acquire higher treated water quality and not using a or minor change with inside the established infrastructure, only through easy alteration of the process control parameters in a single or more of the phases of the treatment cycle. The SBR process offers smaller foot-print area, decrease funding cost, decrease operation complexity, and considerable control overall performance compared to traditional treatment process. If nicely designed, the process can also additionally acquire significant degree of organic nutrient elimination too.

Typical outlet performance for domestic waste water (without tertiary treatment) by SBR

BOD (mg/l)	< 10
TSS (mg/l)	<10
Fecal coli form removal (log unit)	Up to 3 < 4
TOTAL NITROGEN (mg/l)	<10
TOTAL PHOSPHORUS (mg/l)	<2
OIL AND GREASE (mg/l)	<5
Ph	6.5-8.5

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